

5-3 Dividing Polynomials

Poly
Mono

$$\frac{5a^2b - 15ab^3 + 10a^3b^5}{5ab}$$

$$\frac{5a^2b}{5ab} - \frac{15ab^3}{5ab} + \frac{10a^3b^5}{5ab}$$

$$a - 3b^2 + 2a^2b^4$$

Poly
Binomial

$$\begin{array}{r} \textcircled{24} \\ 5 \overline{)120} \\ \underline{-10} \downarrow \\ 20 \\ \underline{-20} \\ 0 \end{array}$$

$$\begin{array}{r} \textcircled{30} \frac{3}{5} \\ 5 \overline{)153} \\ \underline{-15} \\ 03 \\ \underline{-0} \\ 3 \end{array}$$

ex:

$$\frac{3y^3 - 5y^2 + y - 6}{y-2}$$

$$\begin{array}{r} \textcircled{3y^2 + y + 3} \\ y-2 \overline{)3y^3 - 5y^2 + y - 6} \\ \underline{-3y^3 + 6y^2} \\ y^2 + y \\ \underline{-y^2 + 2y} \\ -3y - 6 \\ \underline{-3y + 6} \end{array}$$

ex:

$$\frac{4x^4 - 19x^3 + 5x + 1}{4x - 3}$$

$$\begin{array}{r} x^3 - 4x^2 - 3x - 1 \\ 4x - 3 \overline{)4x^4 - 19x^3 + 0x^2 + 5x + 1} \\ \underline{-4x^4 + 12x^3} \\ -16x^3 + 0x^2 \\ \underline{+16x^3 + 12x^2} \\ -12x^2 + 5x \\ \underline{+12x^2 - 36x} \\ -29x + 1 \\ \underline{-29x + 87} \\ -86 \end{array}$$

$$\begin{array}{r} x^3 - 4x^2 - 3x - 1 + \frac{-2}{4x-3} \\ \underline{-2} \end{array}$$

Synthetic Division

where "x - c" is the divisor

ex:

$$\frac{3y^3 - 5y^2 + y - 6}{y - 2}$$

$c = 2$

$$\begin{array}{r|rrrrr} 2 & 3 & -5 & 1 & -6 & \\ & & 6 & 2 & 6 & \\ \hline & 3 & 1 & 3 & 0 & \end{array} \leftarrow \text{Remainder}$$

$3y^2 + y + 3$ ↑ Depressed Equation

Do:

$$\frac{2t^4 + 5t^3 - 4t^2 + 9}{t + 3}$$

$c = -3$

$$\begin{array}{r|rrrrrr} -3 & 2 & 5 & -4 & 0 & 9 & \\ & & -6 & 3 & 3 & -9 & \\ \hline & 2 & -1 & -1 & 3 & 0 & \end{array}$$

$2t^3 - t^2 - t + 3$

ex:

$$\frac{4x^4 - 19x^3 + 5x + 1}{4x - 3}$$

$4(x - \frac{3}{4})$

$$\frac{1}{4} \left[\frac{4x^4 - 19x^3 + 5x + 1}{(x - \frac{3}{4})} \right]$$

$$\begin{array}{r|rrrrr} 3/4 & 4 & -19 & 0 & 5 & 1 \\ & & 3 & -12 & -9 & -3 \\ \hline & 4 & -16 & -12 & -4 & -2 \end{array}$$

$$\frac{1}{4} \left[4x^3 - 16x^2 - 12x - 4 + \frac{-2}{x - \frac{3}{4}} \right]$$

$$x^3 - 4x^2 - 3x - 1 + \frac{-2}{4x - 3}$$

CW (check for understanding)

p236-237

15, 33 (long), 37, 41, 43, (synthetic)

Example:

$$15. \frac{9a^3b^2 - 18a^2b^3}{3a^2b}$$

$$33. \frac{x^5 - 7x^3 + x + 1}{x + 3}$$

$$37. (t^5 - 3t^2 - 20)(t - 2)^{-1}$$

$$41. \frac{9d^3 + 5d - 8}{3d - 2}$$

$$43. \frac{2x^4 + 3x^3 - 2x^2 - 3x - 6}{2x + 3}$$